ARISTURTLE

ARISTOTLE UNIVERSITY RACING TEAM
ELECTRIC & DRIVERLESS

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The Team

Aristotle University Racing Team Electric & Driverless, also known as **Aristurtle**, is a student research team from Aristotle University of Thessaloniki that designs, develops and manufactures **electric and driverless race cars**. The team belongs to the School of Electrical and Computer Engineering and is composed of **undergraduate students** from various fields, from Electrical Engineering, Mechanical Engineering to Physics and Economics. Working under the pressure of demanding deadlines, the members of the team are shouldered with duties that require full use of their **theoretical and practical skills** in order to be confronted successfully.

The faculty advisor, responsible for the representation of the team in the academic community, is **Mr. Minas Alexiadis**, Assistant professor of the School of Electrical and Computer Engineering at Aristotle University. Manufacturing of electric race cars is executed according to the rules and standards of **Formula Student**. This process is guided by three Electrical Systems Advisors, PhD graduates from the Electrical Machines Laboratory. The team is divided into eight subteams that work in different parts of the vehicle and cooperate according to their needs. The Chief Executive Officer is responsible for the coordination of all the subteams, in order to achieve a fully consolidated and perfectly functional result.

Goal

Aristurtle's goal is to design and manufacture excellent electric race cars and take part in international Formula Student competitions against academic institutions from all around the world.

Electra

Electra is the team's first race car and the beginning of a new era in Greek motorsport.

Iris

In mythology, Iris was the Gods' messenger. In our reality, Iris is the Aristurtle's third electric race cars.

Thetis DV

A new era in both Thetis' and the team's course began when it was transformed to an autonomous vehicle, the first in Greece.

Eve

It was the one who determined the standards for the future philosophy of the team's race cars.

Thetis

The awards and international podiums during the 2018-2019 season have established Thetis' place in history.

Nemesis

Designed with a pretty different approach in comparison to its predecessors, Nemesis built the foundation for a new mindset in Aristurtle's vehicles.

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ELECTRICAL

Autonomous
High Voltage
Low Voltage

MECHANICAL

Aerodynamics
Frame & Composites
Suspension

OPERATIONS

Finances
Promotion
Static Events

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AERODYNAMICS

Aerodynamics is the branch of dynamics that deals with the motion of air and other fluids and with the forces that act on the bodies that move relatively to such fluids. This sub team is responsible for setting the aerodynamics goals for the season, i.e. how much downforce is needed, the position of the center of pressure etc, designing the components, and then manufacturing them using carbon fiber composite materials.

A formula student vehicle is vastly different from the rest of the motorsport vehicles. Due to its low mass and strong motors, it is capable of accelerating rapidly. But, due to the fact that the race tracks have many corners and short straights, the maximum speed that the vehicle can reach does not exceed 120km/h.

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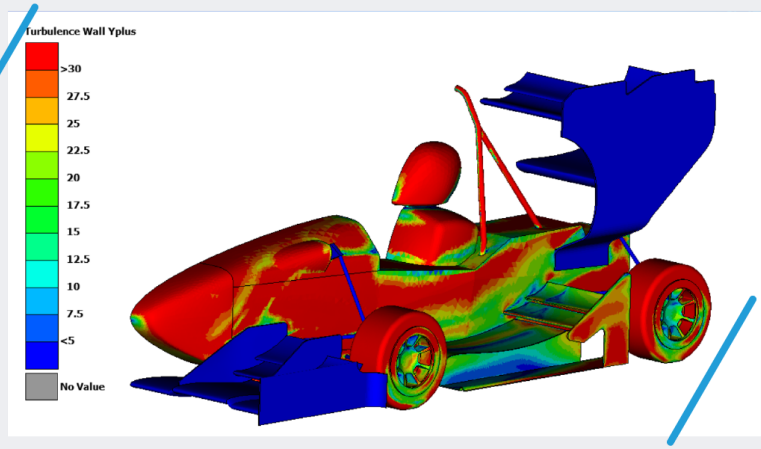
It is important to generate as much downforce as possible to ensure faster cornering speeds while also reducing drag as much as possible in order to limit power losses due to friction. To ensure optimal performance, it is necessary to study the airflow around the design while also adjusting the different components in order to maximize the coefficient of lift and minimize the coefficient of drag.

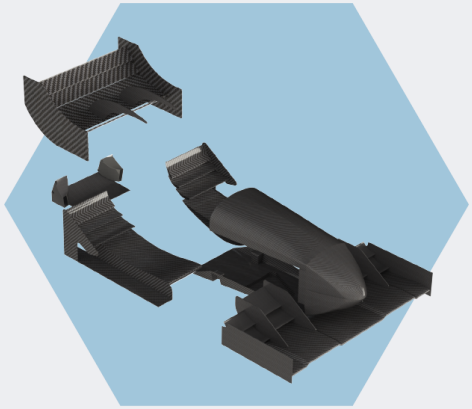
To achieve the above, we conduct fluid analysis using computational fluid analysis (CFD). The first step is to design a 3D model of the aerodynamic design in an appropriate 3D CAD software. The next step is to import the design into ANSA, a BETA CAE Systems software, which allows us to “clean” the geometry and set the boundaries. Next comes the meshing step, where the volume is discretized using an appropriate element geometry and mesh. After this, it is necessary to set the appropriate boundary conditions and only then, can the model be solved using an appropriate solver. After obtaining the results, they are evaluated, the design is altered as necessary and the process is repeated.

This process aims at the optimization of the aerodynamic devices based on the vehicle’s needs which leads to the development of an aerodynamics package tailor made for the vehicle.



Manufacturing & Integration

After finalizing the design of the various components, the aerodynamics sub team has to manufacture all of the components. Its aim is to manufacture lightweight components. This is achieved with the use of composite materials, and mainly carbon fiber reinforced polymers. After this, comes the integration of the aerodynamics package with the rest of the vehicle. Finally, comes the experimental validation, namely, track runs with and without aerodynamic devices, use of strain gauges, potentiometers and also deflection tests from load application.



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Το μέλλον της ενέργειας

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Aristotle University of Thessaloniki

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